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(54) CLEANING DEVICE FOR FLOORS AND OTHER SURFACES

(71) I, ALOIS SCHWAMBORN, a German citizen of Postfach 21, Robert-Bosch-Strasse, Wangen-Göppingen D 7321, Germany, trading as the firm of A. SCHWAMBORN, ELEKTRO-MASCHINENBAU, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a general purpose cleaning device for cleaning floors of all types or other surfaces and having a handle, and various interchangeable cleaning tools such as brushes, polisher discs and the like which are generally set in rotation by a motor about a vertical axis. Such devices have already been in extensive use for some time. It is also known to provide such cleaning devices with an additional means for shampooing carpets. The shampooing means hitherto used for this purpose had the disadvantage, however, that the carpets were too heavily wetted during the shampooing operation and consequently a comparatively long drying time was necessary before they could again be trodden on after the shampooing. When the carpets are wetted too heavily during the shampooing, there is also a considerable danger of discolouration with carpets which are not entirely colour-fast. Finally, with a relatively heavy wetting, the carpets tend to shrink and particularly with permanently laid carpets, this can also result in their adhesive bond becoming loose.

It is the primary object of the invention to provide a shampooing means for a general purpose floor-cleaning machine, in which the disadvantages referred to above are substantially avoided and which makes possible a thorough cleaning, especially of permanently laid carpet floor coverings, with substantially less wetting of the carpets, and consequently necessitates only a fraction of the time period formerly required between the shampooing operation and the time when walking on the carpets is again possible.

[Price 25p]

According to the invention we provide a general purpose cleaning device for cleaning floors or other surfaces with interchangeable cleaning tools, comprising means for rotating a cleaning tool, means for releasably fixing a cleaning tool to the cleaning device, means for generating foam for application to the releasably fixed cleaning tool, wherein the means for generating foam for application to the cleaning tool comprises a container for foamable liquid shampoo mounted on the cleaning device and closable in a gas-tight manner, the said container being capable of being held under super-atmospheric pressure and having an input region for admission of foamable liquid shampoo and having a liquid discharge opening, preferably regulatable by a valve, a first conduit for flow of compressed gas under superatmospheric pressure leading from the input region of the said container, a second conduit leading from the said liquid discharge opening, means for combining the flows of the said first and second conduits to enable the compressed gas and liquid shampoo to mix together to generate wet foam and means for discharging the generated wet foam through a porous applicator, serving as a fine foam generator, for uniform application to the cleaning tool. The cleaning tool may for instance be an annular brush or polisher disc. Preferably the container for liquid shampoo is releasably fixed to the cleaning device. The applicator may conveniently be a hollow disc or drum having fine pore material, e.g. sintered porous material, at its outer circumferential portion.

Since the formation of the wet foam is effected with the device according to the invention by introducing shampooing liquid from a supply container, which is under the same superatmospheric pressure as the compressed gas, generally air, supply conduit, into the said conduit which leads to the said applicator, a separate wet foam container is completely unnecessary and thus a considerable reduction in the size of the whole device is obtained. The arrange-

ment of a regulating valve for the liquid discharge opening of the container for the shampooing liquid is desirable and permits the mixing ratio between compressed gas, generally air, and shampooing liquid to be sensitively adapted to the local degree of soiling of the surface to be cleaned without the need for any throttling of the compressed, gas usually air, supply during the operating of cleaning the respective type of carpet or other soiled surface.

As regards the means for generating foam according to the invention, the provision of an applicator arranged centrally in an annular cleaning brush which is rotatable about a vertical axis is particularly advantageous. By this particularly advantageous construction, all the foam discharged from the applicator is in fact brought into the annular contact surface of the brush for an intensive action on the carpet to be cleaned, since the foam is only able to pass into the open by the route through the bristles of the revolving brush and from the cavity inside the brush. With the cleaning device according to the invention it has been possible successfully to produce an extremely effective cleaning of carpets with a considerably reduced consumption of shampooing liquid per square metre of surface cleaned and thus to shorten the drying time required to a fraction of the time which was formerly needed.

A preferred form of general purpose cleaning device illustrating the invention will now be described with reference to the accompanying drawing having two Figures. In the drawing:

Figure 1 shows a general purpose cleaning device in elevation and partly broken away; and

Figure 2 is a longitudinal section to an enlarged scale of the applicator of Figure 1.

The general purpose cleaning device shown in simplified and diagrammatic form in Figure 1 consists essentially of a downwardly open housing 1 and a driving motor 2 which is able, through a reduction gear 3, 4, to set in rotation different interchangeable cleaning tools, such as a brush 5 or the like, about a hollow shaft 6. The brush 5 is releasably fixed to the gear 4 by a bayonet catch connection, the brush 5 being provided with three studs 5a symmetrically arranged for this purpose, one of which is shown. Detachably held on a stem 7 connected with the housing 1 with a handle 8 serving for the guiding of the cleaning device is a container 9 for a shampooing liquid, which container can be closed in pressure-tight manner. The container 9 can be supplied with compressed air through a pipe 10 from any appropriate compressed air generator, as for example, a vacuum cleaner or the like. From the

container 9, a compressed air pipe 11 extends to a wet foam generator 12 connected with an applicator 13 (i.e. a fine foam generator) arranged centrally inside the brush 5. In the wet foam generator 12, the shampooing liquid discharging from the container 9 through opening 14 by way of a regulating valve 14' and a pipe 15 is mixed with the compressed air passing through pipe 11. The air-liquid mixture is transformed as it passes through the applicator 13 (i.e. fine foam generator) into a comparatively dry, fine-bubble foam, which initially fills cavity 16 inside the shampooing brush 5 and then is used on the entire annular contact surface between the bristles 17 and the carpet pile 18 for intensive cleaning. By altering the position of the regulating valve 14', for example, by means of a linkage 19, 20, preferably operable from the handle 8 of the cleaning machine, the proportion of liquid in the air-liquid mixture can be regulated as desired, so that the cleaning takes place with a very small quantity of liquid remaining on the carpet, which dries to such a degree within about 1 hour that it is again possible to walk on the carpet.

Figure 2 shows in detail an applicator corresponding to an applicator 13 of Fig. 1, i.e. a fine foam generator, consisting of a hollow drum 21 of fine-pore material at its outer circumferential portion and flat closed walls 22, 23 and a fixing union 24 arranged centrally in the upper wall 22 and having an inlet opening 25 for the air-liquid mixture passing through hollow shaft 6 (Fig. 1). It has proved particularly suitable for forming a dry foam with bubbles as fine as possible to construct the hollow cylinder 21 of a sintered material consisting of fine metal grains, such as is known *per se*, for example, as a filtering material.

WHAT I CLAIM IS:—

1. A general purpose cleaning device for cleaning floors or other surfaces with interchangeable cleaning tools, comprising a handle, means for rotating a cleaning tool, means for releasably fixing a cleaning tool to the cleaning device and means for generating foam for application to the releasably fixed cleaning tool, wherein the means for generating foam application to the cleaning tool comprises a container for foamable liquid shampoo mounted on the cleaning device and closable in a gas-tight manner, the said container being capable of being held under superatmospheric pressure and having an input region for admission of foamable liquid shampoo and having a liquid discharge opening, a first conduit for flow of compressed gas under superatmospheric pressure leading from the input region of the said

- container, a second conduit leading from the said liquid discharge opening, means for combining the flows of the said first and second conduits to enable the compressed gas and liquid shampoo to mix together to generate wet foam and means for discharging the generated wet foam through a porous applicator, serving as a fine foam generator, for uniform application to the cleaning tool.
2. A cleaning device according to Claim 1, wherein the liquid discharge opening is regulatable by a valve.
3. A cleaning device according to Claim 1 or Claim 2, wherein the cleaning tool is an annular brush or polisher disc.
4. A cleaning device according to any preceding claim, wherein the container for liquid shampoo is releasably fixed to the cleaning device.
5. A cleaning device according to any preceding claim, wherein the applicator is a hollow drum or disc having fine pore material at its outer circumferential portion.
6. A cleaning device according to Claim 5, wherein the fine pore material is sintered porous material.
7. A cleaning device according to any preceding claim, wherein the applicator is arranged centrally relative to the cleaning tool.
8. A cleaning device according to any preceding claim, wherein the cleaning tool is rotatable about a shaft.
9. A cleaning device according to Claim 8, wherein the applicator is mounted on the end of the shaft.
10. A cleaning device according to Claim 9, wherein the said end of the shaft is hollow and constitutes a conduit for the generated foam immediately prior to discharge through the applicator.
11. A cleaning device according to Claim 2 or to any claim appendant thereto, wherein the said valve is actuated by actuating means on the handle.
12. A cleaning device according to Claim 11, wherein the said actuating means comprises linkage means.
13. A cleaning device substantially as hereinbefore described and illustrated by the accompanying drawings.
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